

What is claimed is:

1. A method of providing access, comprising:
  - capturing an image of a subject;
  - performing a head finding process of said image;
  - performing an eye finding process of said image; and
  - normalizing said image.
2. The method according to claim 1, wherein said subject is placed against a fixed background.
3. The method according to claim 2, further comprising:
  - sampling said fixed background to develop a statistical model of said background prior to capturing said image.
4. The method according to claim 3, further comprising:
  - performing a subtraction of said fixed background to obtain said image.
5. The method according to claim 1, further comprising:
  - receiving an input of personal information and access privileges of said subject after said image is captured.
6. The method according to claim 4, wherein said subtraction replaces pixels of said fixed background with zero, and non-zero pixels define said image.

7. The method according to claim 6, wherein said head finding process comprises:

tracing a contour of a head and shoulders of said image to determine where said head ends and said shoulders begin.

8. The method according to claim 7, wherein said head finding process further comprises:

placing said head in a standard position with eyes of said subject being disposed in specific pixel locations.

9. The method according to claim 8, wherein said eye finding process is performed to a formula where an orthogonal matrix,  $\mathbf{Q}$ , minimizes a difference between a matrix,  $\mathbf{M}$ , and a matrix product  $\mathbf{QN}$ , where  $\mathbf{N}$  is another matrix, such that  $\| \mathbf{M} - \mathbf{QN} \|$  is a minimum.

10. The method according to claim 9, wherein said eye finding process is performed to a formula where said orthogonal matrix,  $\mathbf{Q}$ , minimizes a term:  $\| \mathbf{B} - \mathbf{QA} \|$  where  $\mathbf{A}$  is a result of said head finding process, and  $\mathbf{B}$  is a fixed reference image in said standard position, such that strong features of image  $\mathbf{A}$  are transformed into corresponding features of image  $\mathbf{B}$ .

11. The method according to claim 10, wherein said normalization step includes **Q** which rotates eye locations in image **A** into eye locations in image **B**, which yields eye locations for image **A** and places image **A** into said standard position.

12. The method according to claim 1, further comprising:  
performing an identification process of said image.

13. The method according to claim 12, wherein said identification process includes using a weighting function,  $v$ , which is applied to said image and which places a greater weighting on differences in eyes-cheek-nose-mouth regions of said image.

14. The method according to claim 1, wherein a numerical template of said image is no more than 88 bytes.

15. The method according to claim 12, wherein at least one pose of said subject is stored as an image in said image capturing device.

16. The method according to claim 15, wherein a number of poses of said subject is pre-selected.

17. The method according to claim 15, further comprising:  
performing an authentication process of said image.

18. The method according to claim 17, wherein said identification process further comprises:

comparing a numerical representation of said image captured by said image capturing device to a numerical representation of said stored images.

19. The method according to claim 18, wherein said authentication process further comprises:

determining whether a distance between said numerical representation of said captured image and each of said stored images is less than an authentication threshold.

20. The method according to claim 19, further comprising:

notifying said subject as to whether an identity of said subject is authenticated.

21. The method according to claim 20, further comprising:

storing said captured image in one of a database and a smart card.

22. The method according to claim 21, further comprising:

logging and storing all attempts at access in said database to form an audit trail.

23. The method according to claim 21, wherein said smart card is one of a contact-type and a contactless card.

24. The method according to claim 17, wherein said identification process further comprises:

comparing a numerical representation of said image captured by said image capturing device to a numerical representation of a stored image on a smart card.

25. The method according to claim 24, wherein said smart card is embedded with a biomatrix of said subject.

26. The method according to claim 25, wherein said smart card includes access information on said subject.

27. The method according to claim 26, wherein said smart card is one of a contact-type and a contactless card.

28. The method according to claim 17, wherein said identification process further comprises:

comparing a numerical representation of said image captured by said image capturing device to a numerical representation of a stored image on a database accessed over the internet.

29. The method according to claim 17, wherein said image capturing device is wireless, and said stored images are stored in said wireless image capturing device.

30. The method according to claim 1, further comprising, prior to said capturing step:

requesting an image from said subject when on-line access is requested.

31. The method according to claim 1, further comprising, prior to said capturing step:

requesting an image from said subject when logon access is requested from said subject.

32. The method according to claim 31, wherein said logon access is requested when a computer is directed by said subject to leave screen saver mode.

33. The method according to claim 20, wherein when said identity of said subject is not authenticated, access is denied.

34. The method according to claim 1, wherein access is time-limited.

35. The method according to claim 1, further comprising:  
monitoring at least one of eye movement using said eye finding process, and head movement using said head finding process, to detect drowsiness.

36. The method according to claim 35, wherein drowsiness is determined when said at least one of eye movement and head movement reaches a predetermined threshold value.

37. The method according to claim 36, wherein when said predetermined threshold value is reached, an alarm is triggered.

38. The method according to claim 21 or claim 24, wherein said smart card includes an identification card, a passport, a visa, a credit card, a time card, and a boarding pass.

39. The method according to claim 33, wherein said authentication and said denial of access are performed by voice prompt.

40. A method of detecting drowsiness in a driver operating a vehicle, comprising:

monitoring at least one of eye movement and head movement of the driver; and triggering an alarm when said at least one of eye movement and head movement reaches a predetermined threshold value.

41. A method of performing security on passengers traveling on a vehicle, comprising:

encoding a passenger's biomatrix on a boarding pass; and

comparing said biomatrix to a predetermined database of passengers.

42. The method according to claim 41, further comprising:

taking a second biomatrix of said passenger prior to boarding; and

comparing said second biomatrix to said biomatrix encoded on said boarding

pass.

43. A method of providing personalized game play to a user, comprising:

receiving a selection of a character for personalized play in a game;

capturing an image of the user; and

replacing said character in said game with said image of the user.

44. The method according to claim 43, further comprising:

converting said image of the user to a biomatrix, and using said biomatrix to

generate a face of the user for replacement with said character in said game.

45. A toy comprising:

means for recognizing a face of a user; and

means for notifying said user whether said face is recognized.

46. The toy according to claim 45, further comprising:

a power source.

47. The toy according to claim 46, further comprising:

means for recharging said power source.

48. The toy according to claim 46, wherein said recognition means comprises:

means for capturing an image of said user;

means for performing a head finding process of said image;

means for performing an eye finding process of said image;

means for normalizing said image; and

means for identifying said image.

49. The toy according to claim 48, wherein said identifying means comprises:

means for comparing a numerical representation of said image to a numerical

representation of stored images.

50. The toy according to claim 49, further comprising:

means for authenticating said user.

51. The toy according to claim 50, wherein said authenticating means comprises:

means for determining whether a distance between said numerical representation of said captured image and each of said stored images is less than an authentication threshold.

52. The toy according to claim 45, wherein said notification means comprises:  
a speaker which delivers a voice prompt.

53. The toy according to claim 45, further comprising:  
means for recognizing a voice of said user.

54. The toy according to claim 48, wherein said image capturing means is a  
camera disposed in eyes of the toy.

55. The toy according to claim 53, further comprising:  
a reset device which resets the recognition means.

56. A method of providing access, comprising:  
capturing an image of a subject against a fixed background using an image  
capturing device;  
normalizing said image;  
performing an identification process of said image; and  
performing an authentication process using said image.

57. A method of enrolling a subject in a biometric system, comprising:  
capturing an image of the subject using an image capturing device;  
performing a head finding process of said image;  
performing an eye finding process of said image;

normalizing said image; and

storing said image.

58 A system for providing access, comprising:

means for capturing an image of a subject;

means for performing a head finding process of said image;

means for performing an eye finding process of said image; and

means for normalizing said image.

59. The system according to claim 58, further comprising:

means for identifying said image.

60. The system according to claim 59, further comprising:

means for authenticating said image.

61. The system according to claim 60, further comprising:

means for notifying said subject as to whether an identity of said subject is

authenticated.

62. The method according to claim 58, further comprising:

means for storing said captured image in one of a database and a smart card.